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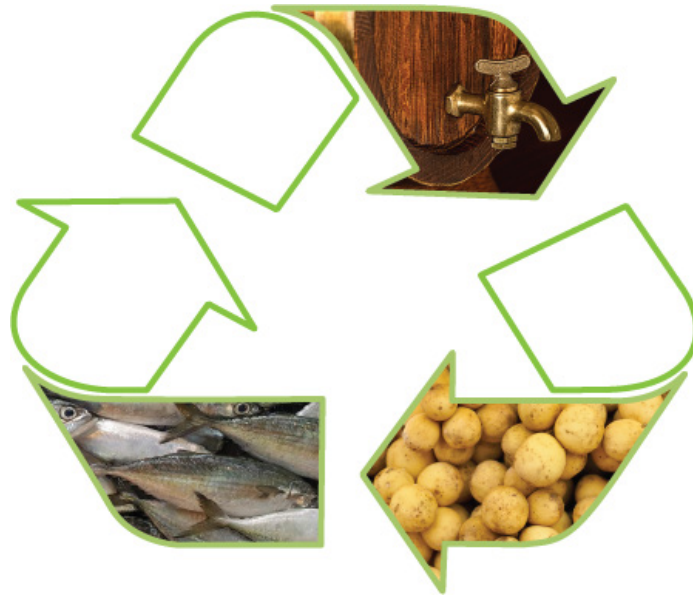


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SYMBIOMA

Technology Innovations and Business Models for Valorisation of Industrial Waste Biomass in Sparsely Located Enterprises



Digital Marketplaces and Platforms for Sharing and Recycling Wastes and Side Streams in European Countries

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1 Introduction and background

Industrial symbiosis is a system approach for a more sustainable and integrated industrial system, which identifies business opportunities that leverage underutilised resources (such as materials, energy, water, capacity, expertise, assets, etc.). Industrial symbiosis involves organisations operating in different sectors of activity that engage in mutually beneficial transactions to reuse waste and by-products, finding innovative ways to source inputs and optimising the value of the residues of their processes. Industrial symbiosis has also been seen as a practical approach to “enhance resource efficiency, reduce waste generation and green house gases (GHG) emissions via material, energy, and by-products exchange between different processes and industries”, and thus has been included at the core of strategies to promote the transition towards the Circular Economy, through promoting flows of resources through multiple cycles across different sectors of activities and supply chains.¹

Collaboration among organizations, producers, and processors is one of the most important factors in developing industrial symbiosis. It has been noticed both operationally and academically, that industrial symbiosis processes can be enhanced, both in abundance and with respect to their economic, social, and environmental performance, through Web-based platforms expressly aimed at supporting the transition of industrial processes towards industrial symbiosis². Different projects and operators have developed digital platforms with the idea of promoting active participation and collaboration between stakeholders, organizations, and citizens. Those sorts of platforms ideally enable industrial symbiosis through gathering information about resources and potential substitutes in order to recommend waste-to-resource exchanges³. Common platforms and marketplaces are used to bring together material streams, increase their visibility, create new ways to utilize materials, and to ensure that more and more materials will be recovered. The development of recycling markets has an important role to increase the value of recycled materials and to enhance their life circle.

This report brings together information about digital platforms, databases, and marketplaces for recycling of side and waste streams and second-hand materials and items in different European countries. This report is delivered by the Interreg Northern Periphery and Arctic funded project SYMBIOMA - Technology Innovations and Business Models for Valorisation of Industrial Waste Biomass in Sparsely Located Enterprises (the project number “352”). The information therefore included in this report mainly focuses on the partner countries of the project, Finland and Ireland, where several marketplaces and platforms have been developed for the use of companies and/or individuals

1 Domenech, T., Bleischwitz, R., Doranova, A., Panayotopoulos, D. & Roman, L.. 2019. Mapping Industrial Symbiosis Development in Europe - typologies of networks, characteristics, performance and contribution to the Circular Economy. *Resources, Conservation and Recycling*. Vol. 141, 76-98.

2 Barile, S., Bassano, C., D'Amore, R., Piciocchi, P., Saviano, M. & Vito, P.. 2021. Insights of Digital Transformation Processes in Industrial Symbiosis from the Viable Systems Approach (VSA). *Sustainability*. Vol. 13, Issue 17, 9696.

3 Jaca, C., Rincón-Moreno, J., Barrenechea, P. & Ormazabal, M.. 2021. Promoting Circular Economy Through Industrial Symbiosis Platforms: A Comparative Analysis. In De la Fuente, D., Pino, R., Ponte, B. & Rosillo, R. (Eds.) *Organizational Engineering in Industry 4.0*. Cham: Springer, 205-212.

2 Marketplaces in Finland

2.1 Materiaalitori provided by Ministry of the Environment

Materiaalitori (www.materiaalitori.fi) is intended for the professional exchange of waste and production side streams from companies and organisations. Materiaalitori also has search functions and offers several related services, such as waste management and consulting services. Organisations with a business ID producing or utilising waste or side streams, or offering related services, can use Materiaalitori free of charge. Certain authorities can also use the service for managing their statutory duties. The service is not intended for private individuals, at least at this initial stage.

Materiaalitori accelerates the circular economy and increases transparency. Municipalities have an obligation to organize the management of waste generated in housing and from municipal administrative and service activities. Companies and other organizations use market-oriented waste management services. When private waste management services are not available, waste holders have to use the supplementary waste management service provided by municipalities. The reformed Waste Act entered into force on the 1st of January 2020, requires those waste holders whose need for their municipality's supplementary waste management services exceeds 2 000 € to use the Materiaalitori service. This requirement applies to public waste holders - i.e., procurement units, in Finland as of the 1st of January 2021.⁴

Materiaalitori is provided by Ministry of the Environment and maintained by Motiva Ltd. The marketplace has 1 467 registered users that represent 1 183 companies and organizations. The site had 61 listings December 9th, 2021.

2.2 ResQ Club

ResQ Club (www.resq-club.com) is a Finnish company delivering a digital marketplace of surplus food, thus helping restaurants, cafes, bakeries and grocery stores to reduce food waste. ResQ turns the lost revenue from companies' unsold meals (for example portions from lunch surplus or ingredients from the restaurant kitchen) into an extra revenue stream by bringing in customers who are willing to pay for the surplus food. One sold meal brings on average 4 € to the restaurant or cafe. ResQ Club deducts a 25% sales commission.

Customers can purchase the surplus food via the ResQ mobile application where the meals are mapped and listed. The meals are paid with a payment card or Pay Pal directly via the application. ResQ orders are ready for pickup immediately after the order.

More than 200 000 portions are sold, and 500 tons of CO₂ emissions are saved every month by ResQ Club. The club works also in Sweden and Denmark.⁵

⁴ Motiva Ltd. 2021. Materiaalitori. Available at: https://www.motiva.fi/en/solutions/material_efficiency/materiaalitori. Accessed 1 December 2021.

⁵ ResQ Club. 2022. Leave no meal behind. Available at: www.resq-club.com. Accessed 12 January 2022.

2.3 Marketplaces for demolition side streams and construction materials

Kierto (www.kierto.fi) is a marketplace for construction materials from demolition sites promoting the use of secondary materials. The platform is maintained by Mikkeli development Miksei Ltd as part of Cityloops project funded by the European Union's Horizon 2020 research and innovation programme. Kierto platform has been linked directly to the previously mentioned Materiaalitori. The use of the site is free of charge.⁶

Manufacturing Synergies, mansyns (www.mansyns.fi) is a sales place to make recycling economy possible for companies that have surplus materials to recycle or are providing other resources to other companies. The marketplace is delivered and maintained by Mikkeli Development Miksei Ltd and the South-Eastern Finland University of Applied Sciences via the DCFB project, funded by European Regional Development Fund. The site has been also linked to Materiaalitori.⁷

RakennusOutlet.com (www.rakennusoutlet.com) is an outlet market for surplus of construction materials offered and maintained by Netlet Ltd. Netlet collects useful surplus materials from building sites free of charge and then sells them. The company sorts the materials collected and sells them through their own online shop and warehouse store to builders and house renovators. Prices of the materials are approximately from 50 to 80 % lower than in traditional hardware stores. By winter 2019, about six months after the service was launched, the company had collected 300 000 kilos of usable building materials and equipment from construction sites that otherwise would have gone to waste.⁸ By utilising the service concept, construction companies are able to decrease their waste management costs significantly. Netlet has been characterised as one of "The most interesting companies in the circular economy" by the Finnish Innovation Fund Sitra.

Purkutori (www.purkutori.fi) is a marketplace for companies and habitants to buy and sell demolition and construction materials, used machines, and equipment that is suitable for reuse. The site is maintained by Purkupiha Group Ltd.⁹

Purkukolmio Ltd (www.purkukolmio.fi) is a web shop that sells recycled construction materials, for example windows, doors, screws etc., used tools, and vehicle parts. The site is maintained by Purkukolmio Ltd and receives the materials from demolition sites and estates.¹⁰

2.4 Auctions and marketplaces for other second-hand materials and goods

Kiertonet (www.kiertonet.fi) is an auction platform for the public sector, maintained by Kiertoa Ltd. Companies, public sector, and private people can buy via the auction but only public sector can be a seller on this site.¹¹ Kiertoa Ltd is providing an auction platform also for companies where they can sell unnecessary stuff. The marketplace is available on the site www.huutomylly.fi.¹²

Huutokaupat.com (www.huutokaupat.com) is an auction platform for bailiffs, bankruptcy estates, the public sector, the military, the police and thousands of companies. The value of the stuff sold via the platform is more than 300 million euros per year.¹³ The marketplace is delivered by Mezzoforte Ltd.

6 Kierto.fi. 2020. Cityloops, about. Available at: www.kierto.fi. Accessed 6 October 2021.

7 mansyns. 2019. Find, rent or sell materials, services and workforce. Available at: www.mansyns.fi. Accessed 23 September 2021.

8 The Finnish Innovation Fund Sitra. 2019. Online shop for surplus materials from construction. Available at: www.sitra.fi/en/cases/online-shop-surplus-materials-construction/. Accessed 6 October 2021.

9 Purkupiha Oy. Purkutori. Available at: www.purkutori.fi. Accessed 23 September 2021.

10 Purkukolmio Oy. 2021. Kiertotalouden edelläkävijät. Available at: www.purkukolmio.fi. Accessed 23 September 2021.

11 Kiertoa Oy. Kiertonet.fi, julkisen sektorin huutokauppa. Available at: www.kiertonet.fi. Accessed 11 October 2021.

12 Kiertoa Oy. Huutomylly.fi, Kiertotalouden vauhdittaja. Available at: www.huutomylly.fi. Accessed 11 October 2021.

13 Mezzoforte Oy. Suomen kiinnostavin kauppapaikka. Available at: <https://huutokaupat.com/ilmoittajaksi>. Accessed 11 October 2021.

Huutokauppa.com (www.huutokauppa.com) provides a platform through which independent auction entities can offer their items. The site has a list of the auction entity partners that can utilize the site for selling. The marketplace is maintained by Ifonas AS.¹⁴

Huuto (www.huuto.net) is an online marketplace for citizens and companies for selling mainly second-hand stuff. The site can be used free of charge, and it is maintained by ePrice Ltd.¹⁵

Tori (www.tori.fi) is a marketplace for individuals and SME companies. Both recycled secondhand materials and stuff, and brand-new issues can be sold via the site. The marketplace is a part of Schibsted-Media Group.¹⁶

3 Marketplaces in Ireland

3.1 FoodEra

FoodEra (www.foodera.ie) is an online business to business marketplace that connects food producers and farmers to retailers / restaurants, bulk buyers, and other food businesses for the sale of surplus substandard usable food produce at discounted prices. Technology is focused towards the reduction of wastage of edible food products.

FoodEra allows food producers, restaurants, grocers, and caterers to list the excess product they want to sell by offering steep discounts. Buyers can discover nearby deals and place the order for pickup from their chosen location.

Users can sign up on the site free of charge and companies are available to list the first ten products for free. FoodEra charges a fee of 1 % on the successful sale that goes towards running the site. Only businesses registered in Ireland can list on the platform.¹⁷

3.2 Waste Busters

Waste Busters (www.wastebusters.ie) is a business to business marketplace for reusable materials and equipment. The site is specifically designed to help make matches between organizations that have reusable materials and those looking for these materials as a feedstock. The materials exchange software is set up and ready for users to join and list their surplus items, as well as to search for items.¹⁸

3.3 eBay Inc.

eBay Inc. (www.ebay.ie) is a global marketplace that connects millions of buyers and sellers in more than 190 markets around the world. The company exists to enable economic opportunity for individuals, entrepreneurs, businesses, and organizations of all sizes. The global sites have totally approximately 1,5 billion live listings, 152 million active buyers and 19 million sellers on the marketplace. The platform covers and is available in many countries all over the world.

14 Ifonas AS. 2016. huutokauppa.com. Available at: www.huutokauppa.com. Accessed 11 October 2021.

15 ePrice Oy. Osta & myy, kun aika on. Available at: www.huuto.net. Accessed 11 October 2021.

16 Schibsted. tori. Available at: www.tori.fi. Accessed 12 January 2022.

17 FoodEra. 2022. 2022. FoodEra, Surplus Food & Waste Recovery Solution. Available at: www.foodera.ie. Accessed 4 January 2022.

18 Waste Busters Ireland, Waste Zero Movement. 2022. Waste Busters. Available at: www.wastebusters.ie. Accessed 4 January 2022.

4 Marketplaces in other European countries

The Circado platform (www.circado.io) is a cross-industrial digital trading platform for industrial side streams. The buyer-oriented trading mechanic separates the commercial details of buy requests and sell offers from the physical properties of side-streams and requested materials. The platform can account for fluctuations in production volume, quality or downtimes. It allows users to get a market overview, find trading partners from all industries, and track price developments.¹⁹

The Circado platform has been developed as part of EIT Food Digital Marketplace for Side Streams project aimed at enabling companies from all over the world to easily search for by-products from various production processes.²⁰

The CircLean project, an initiative of the European Commission is developing an online tool for assessment as well as an online matching tool to support industrial symbiosis transactions. **The CircLean online matching tool** will help the user to:

- Identify partners – The matchmaking functionality will allow a user to identify potential industrial symbiosis partners based on their resources entered and geographic location.
- Gather evidence – The tool will include an evidence-gathering functionality based on the CircLean reporting methodology to measure and report on the benefits of industrial symbiosis.
- Get visibility – By registering for the tool and using the CircLean methodology, users will have the opportunity to apply for the CircLean label.

Together with its network members, CircLean is testing and revising an online tool designed to facilitate industrial symbiosis transactions for businesses in Europe. The beta testing of the tool took place in autumn 2021.²¹

restado.de (www.restado.de) is the largest marketplace for reclaimed construction materials in Europe. The materials come from deconstruction or oversupply, or alternatively materials that are left over from projects. Typical materials include bricks, wood, tiles, windows, doors, and façade elements.

As a specialized platform, restado.de offers specific product information together with building instructions, making the resource suitable for both private and professional buyers. The exchange platform primarily serves German-speaking countries (Austria, Germany, Switzerland) but is planned to expand into other European countries.²²

The online platform **Oogstkaart** (www.oogstkaart.nl) offers the Dutch construction and building sector, among others, the opportunity to offer their residual flows to the market. The goal of Oogstkaart is to contribute to a circular economy and a reduction of the CO2 footprint. The company provides insight into the stock of used and / or circular materials and raw materials, for both purchase and sale.

Since 2020, Oogstkaart has become part of New Horizon Urban Mining that dismantles buildings with the aim of harvesting as many materials as possible for reuse. The scouts of the company recognize the value of products and raw materials from the built environment. Supply and demand are actively brought together by New Horizon and Oogstkaart.²³

19 Rethink Resource GmbH. Introducing Circado. Available at: <https://rethink-resource.com/circado>. Accessed 4 January 2022.

20 Maspex Group. 2022. EIT Food. Available at: <https://maspex.com/zrownowazony-rozwoj/eit-food/2020-digital-market-place-for-side-streams-opracowanie-platfomy-circado/> Accessed 4 January 2022.

21 CircLean. 2022. CircLean, European network for businesses and SMEs for Industrial Symbiosis. Available at: <https://circlean-symbiosis.eu/>. Accessed 4 January 2022.

22 restado.de. 2022. restado, Wiederverwenden statt verschwenden. Available at: www.restado.de. Accessed 4 January 2022.

23 New Horizon Urban Mining. Oogstkaart, The urban mining potential of nl. Available at: <https://www.oogstkaart.nl/about/>. Accessed 4 January 2022.

Marktplaats (www.marktplaats.nl) is a Dutch advertising site that brings buyers and sellers together. The site has more than 8 million unique visitors every month and around 350 000 new advertisements per day. The marketplace is the largest online trading place in the Netherlands for private and business providers of second-hand and new products.²⁴

2dehands (www.2dehands.be) is the largest secondhand online trading platform in Belgium with 3 million unique visitors every month. Both individuals, as well as small and large companies use the site and an average of 70 000 new ads are placed every day.²⁵

24 Marktplaats B.V.. 2022. About Martkplaats. Available at: <https://www.marktplaats.nl/i/help/over-marktplaats/index.dot.html> . Accessed 4 January 2022.

25 Marktplaats B.V. 2021. What is 2dehands? Available at: www.2dehands.be . Accessed 4 January 2022.

5 Conclusion

Globally, many digital systems and platforms have been designed to facilitate the transaction towards sustainability and circular economy by providing operators with a meeting place that enables those offering and needing recycled materials to find each other. However, there are still differences between the marketplaces and their numbers in different countries: The platforms, databases, and marketplaces on the area of the Northern Periphery and Arctic and highlighted by this report were focused in Finland and Ireland. Several online trading platforms were also reported from German-speaking countries (Austria, Germany, Switzerland), and Netherlands and Belgium, together with platforms covering the whole Europe.

There are several digital marketplaces for individuals and public sector where to buy and sell their second-hand goods. These sites have become very popular and user amounts are high when second-hand goods are recycled, sold, and bought by users. Usually the basic use of these sites is free of charge for sellers and buyers if any additional services, such as advertisement, are not needed. These marketplaces deliver a large scale of items varying from household and consumer goods, to cars and even properties.

The idea of digital marketplaces has been also utilised by companies that have built up business concepts to collect and purchase surplus, deconstruction or oversupply materials from construction and demolition sites to minimize waste production and promote the use of secondary materials and goods. The materials are offered for customers via digital marketplaces established by the companies. Typical materials sold on the sites include for example bricks, wood, tiles, windows, doors, and façade elements. The European Regional Development Fund has also contributed in the funding of projects aimed at developing these kinds of public, online trading places of demolition side streams and construction materials and goods.

Comparing the number of marketplaces of construction and demolition materials to those of focused towards the reduction of wastage of edible food products, it can be noticed that the amount of food based online marketplaces is relatively low today. However, it can be assumed that the use of food based digital platforms connecting food producers to other partners and consumers will increase in the future. For example, a Finnish company ResQ Club maintains a digital marketplace of surplus food helping restaurants, cafes, bakeries and grocery stores to reduce food waste. The ease of use of the mobile application as well as the low prices attract consumers to use the system.

Although surplus and secondary goods are changing hands between companies, individuals and/or public sector, there are still needs to enhance professional side stream recycling and foster industrial symbiosis via digital business to business platforms. FoodEra in Ireland is a markable pioneer maintaining an online business to business marketplace connecting food producers and farmers to retailers / restaurants, bulk buyers, and other food businesses for the sale of surplus and substandard usable food produces at discounted prices. In addition, Materiaalitori provided by the Finnish Ministry of the Environment, Circado platform and the CircLean online matching tool are examples of cross-industrial digital trading platforms of industrial side streams facilitating the transaction towards sustainability. The sites enable matchmaking of potential industrial symbiosis partners based on their supply and demand. To foster sustainability, for an example in Finland, the Finnish government has set some policy instruments for public waste holders to use the Materiaalitori service, and certain authorities can also use the service for managing their statutory duties. The use of legislative instruments could increase the number of national digital platforms and marketplaces and promote their use in the future.

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The project partners:

Lead partner



Centria University of Applied Sciences, Finland (CENTRIA)

Other partners



Institute of Technology Sligo, Ireland (ITSligo)



NIBIO

NORSK INSTITUTT FOR
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Norwegian Institute of Bioeconomy Research,
Norway (NIBIO)



Bottenvikens Bryggeri Ab, Sweden (Bottenvikens)



Luleå University of Technology, Sweden (LUT)



Hermannin Winery Ltd, Finland (Hermannin)